FACT SHEET

L-959

KEYS TO CITRUS GROVE MANAGEMENT

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The citrus industry in South Texas is valued at $17 to $20 million annually to growers. About 79,000 acres of commercial citrus are scattered from Brownsville to the Winter Garden area. Most of the citrus is confined to the western portion of Hidalgo County. Grapefruit grown in the Lower Rio Grande Valley has excellent internal quality. Original plantings began in the 1880's, but production has been variable because of freezes in 1949, 1951 and 1962. This variability of supply has made it difficult for Texas citrus to maintain markets.

Land and Water Requirements

Soils of the Lower Rio Grande Valley vary widely, ranging from deep, sandy loams to heavy clays. The best soil type for citrus is a deep, well-drained soil with no impervious clay layers in the subsoil.

Land that has been leveled generally is better for citrus production because of the increased efficiency of irrigation and other cultural practices. There are some difficulties on leveled land when deep cuts are made and all the fertile top soil is moved to one side of the field leaving an exposed subsoil in which to plant on the other side. In such cases, it may take several years to increase the yields of the cut area to productive levels.

Some growers are using a method called "undercutting" to alleviate this problem. In undercutting, all topsoil is moved to one side of the field and only the subsoil is leveled. Once this operation is completed, the topsoil is placed evenly over the leveled subsoil.

Some groves are leveled after the trees are in production. This practice is followed because the cost of irrigating unleveled land increases each year and uniform water penetration is difficult to obtain. For best results, each leveled area should have no more than a 2-foot fall before the operation begins.

Water Quality

Since rainfall most years is inadequate to produce citrus crops, irrigation is a necessity in all citrus-producing areas of South Texas. Most irrigation in the Lower Rio Grande Valley is flood irrigation from the Rio Grande, while a few groves in the northern part of Hidalgo County and citrus in the Winter Garden area are irrigated from wells. The river water normally is of fair quality, but any well water should be checked before use. Total salts for water that will be the only supply for citrus should be 1,000 ppm or less with less than 0.3 ppm Boron and an SAR of less than 8. In cases of severe drouth water can be used with a salt content of up to 1,500 ppm total salt, 1 to 3 ppm Boron and an SAR of up to 15. Water with 1,500 ppm total salt will deposit 2 tons of salt per acre-inch. When this type of water is used, enough must be applied that some leaching through the root zone will occur. Fortunately, spring and fall rains leach much of the accumulated salt out of the root zone when there is adequate drainage.

Varieties

Orange and grapefruit plantings are about equal in the Valley area, with a few small plantings of lemons, tangerines and tangelos. Grapefruit probably is the most profitable because of a developing world-wide oversupply of oranges, and the superior internal quality of grapefruit. The major type of grapefruit grown is the Red Grapefruit with plantings of whites and pinks scattered in the eastern part. A new variety, Star Ruby, retains its red color later in the year but is available in such small numbers that nothing can be said as to its potential or bearing habit.

Marrs is the major early orange planted. This variety usually reaches legal maturity in September but has some problem with rind spotting when harvested at that time. This injury is caused by the rind being immature at harvest. Hamlin oranges mature later (October), and have fewer harvest problems but are smaller and do not produce as much as Marrs. Navel oranges bring a relatively high price most years, but low yields per acre make them unprofitable. Valencia oranges are most widely planted late oranges, maturing in February and being harvested through May. The price has held up well for this variety because it is an excellent processing fruit. Valencia trees yield less than early season oranges. Of all orange varieties grown, the Marrs usually produces more and nets the most income.

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The two most commonly planted tangerine types are the Algerian tangerine and the Orlando tangelo. Since both varieties are self-sterile, pollinators of the other variety or Marrs should be interplanted to insure pollination and good crops.

Most citrus grown in the Lower Rio Grande Valley is on sour orange rootstock because of its salt tolerance and cold hardiness. Cleopatra mandarin experienced less cold damage in the 1962 freeze than the sour orange, but is not used much because of less tolerance to alkaline soils, a tendency to produce smaller sized fruit, less total tonnage and late-bearing characteristics.

Production Practices

Spacing. Tree spacing varies from 25'x30' (58 trees per acre) to as high as 250 trees per acre. The higher density plantings are used to achieve earlier production and increase the possibility of showing a profit before a freeze occurs. Research in other areas indicates that wider spaced groves eventually produce more on a per-tree basis but not on a per-acre basis over a 20-year period. The current recommendation for the Valley is 116 to 140 trees per acre (15' x 25' or 12½' x 25'). Plantings of more trees than this usually result in decreased yield in later years and increased cost of production.

Fertilization. Nitrogen is the only major element generally required by Valley citrus trees, although some groves may have minor element deficiencies of iron, zinc or manganese. Zinc and manganese deficiencies can be corrected by foliar sprays, but soil application of iron chelates is the most effective means of correcting iron chlorosis. Bearing groves require 100 to 150 pounds of nitrogen per acre annually and 200 pounds per acre should not be exceeded. Growers who base their fertilizer on yield should add 1/5 pound nitrogen per box of fruit (100 pounds nitrogen per acre on 500-box yield).

When fertilizing non-bearing trees, make three applications per year during the first 2 years at the rate of ⅛ pound nitrogen per tree per application, in February, May and September. During the third and fourth year, make two applications, one in February and a second in May. The rate at this time should be ¼ pound nitrogen per tree. When the trees are 4 years old, fertilize only once a year. The best time for a single application is January or February.

Weed control. Three types of cultural practices are used in the Lower Rio Grande Valley. They are sod culture, mechanical weed control and chemical weed control. Because of the increased need for water and fertilizer, sod culture is not used much at the present. Many groves are kept semi-clean by means of mechanical cultivation. In these groves, disking is done as needed to reduce weed growth, except from November through February, since winter cultivation makes the trees more susceptible to freeze injury.

The most recent cultural practice is chemical weed control whereby the soil is kept weed-free year around with herbicides. This method is effective on level land with permanent irrigation borders. Chemical weed control in unleveled groves is impractical because the putting up and taking down of the borders destroy the effectivenss of the chemical and water penetration rate is reduced making it difficult to obtain even watering. Groves with a history of iron chlorosis usually exhibit more chlorosis when placed under complete chemical control. Such groves should have strip control only (middles allowed to grow in grass). Properly used herbicides can reduce the overall cost of weed control. However, the first year usually is more expensive because of the high weed population that must be reduced or eliminated before effective weed control can be maintained. Before starting a chemical weed control program, a grower should keep his grove clean by disking for about a year. By so doing, the weed seed population is reduced greatly and storage tissues in perennial weeds are devitalized to the point that the herbicides can do a more effective job. The most commonly used pre-emergence herbicide is Karmex and for perennial grass control most growers use Hyvar-X. For more specific information on materials and rates, see B-1029, *Weed Control With Chemicals.*

Spray program. Citrus usually requires spraying for scale insects and mites at some time during the year. The major scales are chaff, California red, brown soft and purple. These, combined with rust mites, Texas citrus mites and false spider mites, constitute the major insect problems to citrus in the Lower Rio Grande Valley. Two types of spray programs are followed — the so-called "automatic" program and spraying by inspection.

Under the automatic program, the trees are sprayed at post-bloom (three-fourths petal fall) in March or April, the summer oil (June and July), and fall mite (October-November) with an additional spray sometimes in August for brown soft scale control. The inspection program calls for regular inspections and sprays when populations of any damaging insects become heavy enough to lower the grade of the fruit. While the inspection system is the cheapest and most effective in the long run, the inspector must be well qualified or an entire crop can be ruined before the proper spray is applied.

Melanose, a fungal disease, is a problem in areas of high humidity and usually requires spraying in citrus plantings east of Weslaco. For specific amounts and materials, see L-599, *Texas Guide for Controlling Pests and Disease on Citrus.*

Pruning. After young trees have been trained to a proper shape, little hand pruning is required.

High density plantings require hedging after they start to crowd, and the age varies with spacing, vigor, variety and freeze damage. Usually this practice is required after the grove reaches 10 to 15 years of age. Hedging is done by a series of saws. Hedging enables grove machinery and harvest equipment to work without damaging the trees. Most groves are hedged in only one direction and trees are allowed to form a solid hedgerow. Hedged tree yields are low the first year, but are greater over the life of the tree. The best time to hedge is after the fruit has been harvested and before bloom in the spring.

Irrigation and drainage. An important factor in attaining maximum fruit size, tree growth, and ultimate yield is properly managed irrigation. Most groves in the area receive three to four irrigations per year, but from five to seven are necessary to achieve the optimum. Under normal conditions, late spring or early summer is the most critical period, since moisture stress at this time causes fruit size to be reduced. To have enough water to irrigate sufficiently, grove owners have to buy water from other land owners or have about 1 acre of open land for every acre of citrus.

Since irrigation water in this area ranges up to 1,300 ppm total salts, areas lacking in natural drainage eventully require some type of man-made drainage, or production will suffer from high water table and excess salts. Depending on the area, drainwells or ditches are used to drain the excess water. Each individual case merits study before the proper system can be designed.

Cold protection. To minimize damage when a freeze occurs, the grower must consider some means of cold protection. Currently, the infrequency of freezes and price instability make growers reluctant to invest in cold protection devices. Returns on this investment are marginal. Only growers with high yield groves should consider a cold protection system.

The most effective systems in use at present are the solid fuel under-the-tree heaters and those which can be placed at the dripline of the tree. Heaters used in this manner place most of the heat in the tree where it is needed rather than in the middles. Such systems will not protect the fruit and small twigs but will save the trunk and main framework limbs. Trees protected in this manner will be back in production 2 years after a severe freeze.

Marketing

No matter how plentiful and how fine fresh citrus is, it would have little value if effective marketing channels did not exist. Placing the quantity and quality of citrus where people who want it can buy it is carried out by distributors, the so-called "middlemen." Functions of the distributor are not as well understood by the public as those of the producer, leading to misunderstanding as to the value added to a product by marketing.

Harvesting and hauling. The marketing process begins with harvesting and hauling operations that are performed by contract picking crews assembled by the truck owners. These crews are supervised by the field men of the packing or processing firm, but are controlled and paid by the contractor. The harvesting contractor is paid by the buyer on the basis of how much fruit is picked and hauled to a packing shed or processing plant.

The picking rate varies with the type of fruit and method of picking. Early in the harvesting season, "ring picking" is a common practice so that small fruit may be left on the tree to grow larger. This extra care by the picker results in a higher picking cost. Groves with larger and more mature fruit normally are picked on a "clean-the-tree" basis, which is more efficient than ring picking. Harvesting and hauling costs for grapefruit are cheaper than oranges. Currently, harvesting and hauling costs for citrus range from $7.50 to $9.50 per ton.

Packing. Operations performed at the packing house for fresh citrus include degreening, dumping, washing, drying, waxing, grading, sizing, packing and loading. As the fruit moves over grading belts, those with disqualifying characteristics of size, shape or blemishes are removed and the grades separated. Most shippers have cold storage rooms to hold fruit until ready for shipping and for holding slow moving sizes.

Grower outlets. A Texas citrus grower has four potential markets for his fruit. They are: (1) cash buyer or independent shipper, (2) grower cooperative, (3) processor and (4) gift or roadside stands.

A *cash buyer* is a packer who buys the fruit on the tree at a cash price per ton. An independent shipper picks, packs and sells the fruit to a wholesale or retail buyer. About 20 independent shippers in the Rio Grande Valley packed about two-thirds of the total fresh supply of citrus for the 1968-69 season. An independent shipper buys part or all of the citrus grower's crop. It is not uncommon for a grower to sell one or two "ring pickings" from his grove and then sell the balance to a processor. The price that a cash buyer offers to a grower is a blend price. That is, in making his bid, a cash buyer considers the various proportions of fruit sizes such as 112's, 96's, 80's, etc., and the quality such as U. S. No. 1, U. S. No. 2, or juice fruit on trees. In addition, the cash buyer considers current wholesale market prices for the various sizes and quality of citrus. Before making the bid price to a grower, the buyer surveys the entire grove to appraise quality and size.

A *grower cooperative* is a marketing organization owned by a group of citrus growers. The cooperative harvests, packs and sells the fruit for its members. It makes no profit as savings are prorated back to the grower members. Cooperative marketing associations are the second major outlet for a grower's citrus in the Valley. Each cooperative is responsible for harvesting and packing its members' fruit, while the sales for the co-ops are coordinated through one central sales office called Texas Citrus Exchange (TCX). At present, four local marketing cooperatives are owned by growers in the Valley. All members of a given co-op receive the same average price for the particular variety, grade and size of fruit regardless of when the fruit was harvested and sold during the season.

Four citrus *processing firms* are operating in the Rio Grande Valley.

Citrus processing firms in the Valley purchase raw stock citrus primarily by one of three methods: (1) a contract price before delivery is offered to the grower or the packing firm at a fixed price per ton, referred to as a "forward contract price;" (2) a current market price is offered by the processing firm at delivery which is called an "open market" price; and (3) the price may be based on a participating contract with the grower or independent shipping firm; however, these contracts usually do not specify a fixed price.

Some contracts specify that only a given tonnage will be purchased on a participating basis. In recent years, processing has utilized 35 to 40 percent of the total citrus production in the Rio Grande Valley.

During the 1969-70 citrus marketing season, an estimated 10 percent of the grapefruit production, 6 percent of the early orange and 12 percent of the late orange production were sold as *gift fruit or through roadside stands.* The growers who have a gift pack operation usually have a mailing list to which they send brochures each year. Growers who sell their fruit through roadside stands usually are small growers.

Marketing organization. The Texas citrus industry operates under a federal marketing order to solve marketing problems that are too big to solve individually. The industry is governed by a committee composed of representative growers and shippers with authority to make assessments to cover administrative and advertising expenditures. This committee sets minimum grade and size regulations on grapefruit and oranges that are to be shipped from the Valley area and sold for fresh consumption. The citrus industry uses this marketing order as follows:

Quality regulations: These are used to keep inferior grades and less desirable sizes of commodity from depressing the market for the whole crop, and to build consumer confidence. For the 1969-70 marketing season, Texas allowed fresh grapefruit to be sold only as U. S. No. 1 or U. S. No. 2 and so designated on the containers. The Combination Grade (a mix of U. S. No. 1 and U. S. No. 2 grades), used in previous seasons, was discontinued. The minimum size grapefruit allowed to leave the production area was size 96. The grade and size regulations used on oranges was the Combination Grade and U. S. No. 2 Grade and a minimum size of 288. Size refers to the number of this size fruit required to fill a field box.

Standardized container regulations: This order permits the industry to concentrate on the types that consumers and receivers want, and eliminate deceptive containers. Fresh citrus can be shipped from the Rio Grande Valley in 5, 8 and 18-pound bags in a master container; 1 2/5-bushel box carton; and 1 2/5-bushel wire-bound boxes. The ½-box carton is used to ship the largest portion of fresh citrus.

Market research and development: Projects for citrus are set up with funds collected under the order for the purpose of improving the marketing, distribution and consumption of the commodity. These funds also are used for direct advertising and promotion on a national basis. During the 1969-70 season, 4½ cents was collected on each 7/10 bushel carton equivalent and approximately 90 percent of this money was used to advertise Texas citrus in major U. S. markets.

Prices, yields and production costs. The average yields per acre for both grapefruit and early oranges have been about 10 tons, while the average yield for late oranges has averaged 8 tons per acre. Citrus growers have received an average price of $35 per ton for grapefruit and $25 per ton for oranges. Using these averages to determine gross receipts, the average return per acre for grapefruit has been $350 per acre compared to $250 per acre for oranges. A number of citrus groves have produced 15 to 20 tons of good-quality fruit that sold for above average prices.

In general, the production costs of groves owned by absentee landlords and cared for by grove care companies are higher than production costs of groves owned and operated by the same individual. The average annual production cost per acre of citrus for the owner-operated grove is about $220, compared to a cost of $275 per acre for the nonresident owned grove.

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